

T-38 Tank in parade of the Workers' Red Army

Berfoto

THE STORY OF SOVIET ARMOR

by GARRETT UNDERHILL

The second in a series of three articles on Soviet Armor. This article covers the "Middle Ages" (the 1930's). The third of the series "War Years" will appear in an early future edition of the Armored Cavalry Journal. The first story "Early Days" was published in the January-February 1949 issue of the Armored Cavalry Journal.

COMRADES, our army is invincible." This was the assurance Defense Commissar Klementi Voroshilov gave the 18th Communist Party Congress in 1939—the year Hitler unleashed his panzers against Poland. The smartly uniformed Marshal of the Red Army preceded this outburst of confidence with two promises:

"That the enemy will be crushed and destroyed in short order is pledged by the political and moral unity of the Red Army with the entire Soviet people; . . . another pledge is the fact that our Workers' and Peasants' Red Army is a first class army, better than any other army, an army that is technically equipped and splendidly manned. . . ."

The fun-loving marshal and his fellow Reds had

apparent reason to be satisfied. A dozen years before, in simpler, more proletarian uniform (no diamond studded marshal's star existed then), he had stood before an earlier Party Congress; then he had characterized the Red Army as essentially an 18th Century foot and horse force, almost totally lacking in modern armament and equipment. (It then had less than 150 tanks, mostly all of World War I vintage.) He had been alarmed that Russia's industry was hardly more productive than it had been in 1913; in certain categories essential to the production of armor, aircraft, and artillery, in 1927 it was below pre-World War I levels. The limited number of old Czarist small arms, artillery, and other munitions arsenals he had castigated as in "chaos"; he had warned that since World

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War I they had actually backslid. The arms they were producing were of a quality inferior to those of Western forces.

In 1927 the situation as regards the state of general Russian education—not to mention technical training—had been so low that many authorities believed it quite impractical to consider matching the West, either as to the creation of a proper industrial and economic base for modern arms, or as to an army trained to man masses of complex, highly mobile weapons like tanks and planes. It was only nine years since Trotsky had cried: "Proletarians, to horse!"

Yet interested persons could make out a good case to prove—at least statistically—that the impossible task had been accomplished. In those twelve years, under the terrific drive of the three Five-Year Plans (the last got under way in 1937), seemingly fantastic progress had been made:

An ever-expanding economic base for military power had been created; it included basic research, engineering staffs, labor forces; there were basic industries, armaments industries, communications. Commissar Kaganovich in 1939 assured the Party that the railways, one the Achilles' heel of the Red Army and so necessary to the strategic mobility of armor, were in good shape, and sufficiently expanded.

In the arms considered most important—armor, artillery, and air—the Red Army was believed at home and abroad to be vastly superior numerically to any other world power.

Annual truck production, so vital to the tactical mobility of armor and of the army in general—was up from a total of 505 cars and trucks in 1927, to 181,700 trucks produced in 1937. This total was second only to U.S. output, seven times that of France, nearly triple Germany's.

The size of the Red Army as a whole had been increased 3½ times, with regular forces and their reserves finally completely replacing the once more numerous territorial units.

A well-educated officers corps and high command had been turned out by a multitude of intermediate and higher service schools and colleges; they had replaced the uneducated scratch-trained Civil War veterans who, with grudging aid accepted from masses of old Imperial officers, had led the Army in the 1920s.

Better civilian education, general and pre-military, had been capped by multitudinous technical military schools; they had provided many enlisted specialists who, if hours of study counted, were well qualified to man the new arms.

Military theories had been worked out; strategy and tactics of new arms, and of combined arms, had been studied and debated. Extensive experimental tactical work had been done, and results applied to rank and file by intensive training.

The General Index line in 1927 was that the 1927 goal had been reached; that the Red Army was quantitatively and qualitatively up to the standards of Western forces.

This progress had been made despite attempts within industry and the forces to sabotage the program; as early as 1934 foreign advisory engineers were noticing obstructionist tactics by people who resented the authoritarian trend of the Red Revolution, and who feared for Russia's safety should the peasant base of the Army be alienated by harsh regimentation of the farm. Despite the deaths of millions of peasants who resisted the First Five-Year Plan's collectivization drive, the peasant infantry had been as loyal as the largely proletarian air force and incipient armored force.

The widespread 1937-38 purges cleaned out quite incredible numbers of left- and right-wingers (and then some) in the officers corps, but it did not result in apparent serious demoralization of command. There was surprisingly little consequent relaxation of the strict discipline which the Reds had come to believe necessary for maximum effectiveness of modern shock arms in bold assault. Nor was there a loss of confidence in the officers on the part of the men. The clearing out at the top didn't have the same deleterious effect that it might have had in Western forces. While it destroyed some experienced talent, it also rid the army of many older officers who never had enjoyed the general and military educational facilities available to the juniors who took their places; whose Civil War successes had blinded them to the value and proper employment of new arms.

By the end of August, 1939, the men who had set about to achieve these apparent Soviet miracles had some reason to feel that they had done more than create a military version of a Potemkin village—a sham with an impressive false front, but lacking in solid strength and substance. For in 1938 and 1939 the new arms had had a workout against the pride of militarized Japan—the Manchurian-stationed Kwantung Army. Elite segments of Hirohito's regulars which had openly challenged the Reds were virtually wiped out in by-the-book demonstrations of new Red field service regulations and tactical manuals.

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Prior to the war Mr. Underhill spent four years with *Life Magazine* as a military correspondent. He is again serving *Life* in that capacity, while specializing in his own work.

Bachrach
Garrett Underhill

At Lake Khasan (near Vladivostok), the Japanese 19th Infantry Division occupying Chenkufeng Hill was made the object of an assault against a fortified position by the combined arms of the Far Eastern Red Banner Army. After artillery and bombers had practically blown off the hilltop, two regular Red infantry divisions assaulted around either side of the lake which lay in front. Besides their own integral tanks, the infantry were accompanied by independent armored units—organized in brigades—for a total of some 285 tanks. Fighters bombed and strafed. The operation took a day; the Japs sued for an armistice before the Reds could finish off the second hill, but they had meanwhile done heavy damage to Japanese supporting arms when they had neutralized the 19th Division's rear with artillery and aviation.

At Khalkhin-Gol (Nomanhan) in Outer Mongolia, the Far Eastern Army a year later enacted the encirclement and destruction of a hostile force. The Japanese 6th Army received a textbook treatment involving its being pinned down by frontal assault of infantry accompanied by tanks, while independent "mechanized brigades" (pocket armored divisions) swept around the flanks, with cavalry on the extreme outside. The principal character on the Red side was an unknown named Zhukov.

Though actually only the action of corps against corps (the Japanese used "army" to mean "corps," but the Reds' histories always use "6th Army" because it sounds better), this engagement caused a great stir in Soviet circles. To them, action by well equipped regular ground forces of combined arms had far more significance than the third-rate brawl in Spain, on which the European-oriented West had focused its military attention. The Reds recalled how in 1904-5 the then newly created Japanese Army (backed by brand-new industrialization) had surprised the world by whipsawing the big Imperial armies of the Czar—forces on which the Russians had lavished cash and effort for a century. The West proceeded to aggravate the Reds' inferiority complex by paying scant attention to these very significant Far Eastern exchanges of totalitarian military courtesies.

But by 1939 many Westerners had seconded the Reds' own opinion of the Soviet achievement in building a gigantic modern war machine. As early as 1935 General Guderian (Germany's "Father of Panzers") wrote that the Reds had as many as 10,000 tanks. He considered that they had produced in mass their best and most modern armored and motorized equipment. He thought that the Reds had trained their troops excellently in the handling of such matériel, and had adapted their tactics and operational aims excellently to the performance of these troops. A little later the January 12th, 1936 New York *Journal American* set the keynote for the Hearst press when it trumpeted alarms that the Red Army was the greatest fighting machine in the world. This view was seconded the

following December 8th in a banner headline of Lord Beaverbrook's London *Daily Express*.

Soberer elements in the West—who could not be suspected of promoting their own arm, or of otherwise gaining by conjuring up the spectre of the Red bogey—often agreed. Max Werner, the German-trained military writer, in 1939 placed Red tank strength at 20,000. *Die Panzertruppe*, official German armored service journal, published the same year an article giving 4,000 light, 1,000 medium, and 300 heavy tanks as Soviet armored strength. Considering General Guderian's statement that German T/O strength at the start of the 1940 push to the English Channel was 2,200 (including armored cars), it is clear that many in the West thought the growth of Red armored strength as little short of phenomenal for peacetime.

Such statistical crystal-ball games were made the more fascinating during the "Middle Ages" period because it became Soviet official policy to boast of arms progress and preparedness. Whether the Reds were trying to scare off Hitler and gain allies, or whether they were indulging in a bureaucrats' and politicians' round of mutual self-congratulation is a subject for speculation. Nevertheless statements were forthcoming like the Moscow *Pravda* announcement of 1939, which related that in the previous five years the greatest increases in armament had been first in tanks, then in antitank artillery. With a strange disregard for security, *Pravda* blandly assured the Party members that Soviet Russia had from 6,000 to 10,000 tanks.

Armor was not the only branch of service about which the Reds of the day thought out loud in five-figure statistics, and to characterize which they flung about adjectives in the superlative degree. Aviation was another shock arm which had captured the Soviet imagination. As a matter of fact, even prior to the First Five-Year Plan Soviet aviation was organized industrially and tactically on a far larger scale than armor.

The Reds took a practical point of view in recognizing that armor could not fulfill its rôle—especially in enveloping movements—without air aid, and indeed Soviet aviation and flak was created mainly for the tactical support and protection of ground forces. To give this support, in 1936 the Soviet openly announced a program to triple first-line air strength to 15,000 planes. The Army's chief, Marshal Tukachevski (doomed in the later purge) made a most remarkable statement to the Party in 1936, saying of the Army's aircraft program: "When once we can begin serial (Russian for 'mass') production, as we shall be able to do by 1937 at the latest, there will be no overtaking us."

Similar confidence was expressed concerning airborne troops—an arm which the Reds were the first to develop, and in which they were the first to incorporate armor. (The US, Japanese, and British didn't even start until 1940; the Germans began in 1935.)

Of airborne troops, Voroshilov remarked in the mid-1930s that no country could catch up with the lead gained by the Red Army. He added: "There are no such countries, and I think I shall not be wrong in saying there never will be . . ."

To a certain degree this confidence in numbers, this sudden conversion (beginning with the First Five-Year Plan) to confidence in the machine, was symptomatic of the revolutionary state of mind of the Soviet leaders and their fanatical Communist followers. Like all revolutionaries, their emotionalism and imagination was easily aroused by novel ideas. In them the Reds would think they had found the secret of success; that by acting upon them they could out-class the old conservatives. So, just as Lenin once thought that the key to socialism was electrification, and as other early Bolsheviks hailed the idea that agriculture would be revolutionized by the tractor, so the tank and plane and parachute were spectacularly novel forms of war which captured the imagination of Red political leaders who had become semi-militarized as a result of their Civil War experiences.

These flights of Red fancy have largely been forgotten, but it should be recalled that the Polar Concept—so popular in US military circles in 1945-46—was a common subject in the Red press of the 1930s. In 1935 the famous Red Army pilot (later General) Gromo embarked on his trans-Polar flight project which ended up in Southern California in the summer of 1937—the year in which four four-engined TB-3 heavy bombers landed at the North Pole and picked up Papanin's party.

The daydreams of stratospheric trans-Polar flight that appeared in the civil and military Red press were far more ambitious. They were examples of the kind of thinking that in 1936 led one critic to remark: "Any idea invariably takes monstrously hypertrophied and grotesque forms."

As regards armor, the most grotesque concept was born before the First Five-Year Plan was underway. At this time elements of the Red military believed that tanks were capable of obtaining a decision by deep and massive action, largely independent of other arms. It was a belief which persisted until the mid-1930s. In its most hypertrophied form it was represented by the project of a super-super-heavy tank, literally a land battleship. The idea was that a very limited number of these giants would be stationed each at a point behind the frontiers. Special roads would radiate from each base, so that upon the approach of a hostile force the tank guarding the threatened sector could sally forth and utterly destroy the invader. This fantasy was projected about the time of the 6-ton T-18 tank, when Red industry was hardly in a position to carry out such a project should it be deemed practical. A German automotive engineer working on the T-18 actually did some work on the project, which never

got off paper. No giant tanks were ever built, although reports of 80-ton, 100-ton and larger tanks filtered out of Russia between 1925 and 1942. (V. D. Mendeleyev's 1911 tank on which the Soviets base their claim to a Russian's having invented the tank, was a 189 tonner; this engineer, son of the famous chemist now rejected by the Soviets, is supposed to have worked out his project "to its finest details.")

The wild idea of the land battleship had in it all the important factors influencing Soviet military thought at the start of the "Middle Ages" period of armor. There was a hint of the ancient Russian regard for the firepower of artillery—their "God of War"; there was traditional Russian appreciation of shock action—combined with Civil War-instilled belief in the importance of extreme mobility, and the new fad favoring the machine.

Though they couldn't have been worse prepared in matériel, command, and training, at this time the Reds dreamed of the blitz—the possibility of which they were later to deny. They conceived of the rapid conquest of nations with big industrial bases. They hoped to break through cordon of opposing armies by a series of terrific massive blows, swiftly delivered by masses of tanks and armored cars, aided by planes, with cavalry to help in envelopment and pursuit. Armor and motorized forces were looked on as a fine means of penetrating to the interior of a hostile nation, so as to provide its revolutionary proletariat with support sufficient to enable it to throw off its capitalist chains.

This trend of thought was headed in exactly the opposite direction from any concept seeking to exploit the natural genius and fighting qualities of the Russian in defense; it failed to take advantage of Russian space, the peculiarities of terrain and climate. It took a while for the old Czarist military academicians to rein in the mentally frisky new Red military, give them a sounder military education and perspective in the expanding service schools and staff colleges—and to bring them back to the realities of Russia, to a better understanding of Russia's human and material assets and defects.

By 1936, a soberer view of armor was taken. Paragraph 112 of the Field Service Regulations issue that year specified:

"Modern assault weapons, especially tanks, aviation, and mechanized forces (true armored units), employed on a large scale, make possible the organization of a simultaneous attack on an enemy along his entire battlefield, so that he may be isolated, completely surrounded, and destroyed."

Although theory and armament are often in an enigmatic precedence relationship like that of the egg and the chicken, it is obvious from history that the

best armament is that which is built to fulfill specific military concepts. It is a matter of record that weapons are best which, lacking war trials, have their tactical utility and application well established in sizable field exercises. But in their impatience to get cracking on armor, the Red leaders didn't await the results of thorough field and factory experimentation. They didn't build service test lots of various types of tanks and give them prolonged field trials. As soon as the First Five-Year Plan provided a sufficient industrial base, a full set of various types of tanks were put into intensive production.

It is true that in 1928-29 there were some experimental tank and armored car units. All these had to work with were the handful of available T-18s, what would run of the 15 Russki Renos, and what was left of the 80 to 100 British Mark V heavies, Whippets, and French Renaults captured in the Civil War. There were also some two score British Mark I mediums—a tank considered an unsatisfactory armored force vehicle by the British.

This type of heterogeneous force resembled the scratch mechanized Force the British assembled on Salisbury Plain in the summer of 1927; which comprised 48 new mediums, two companies of tankettes, and two of armored cars. It was the same sort of outfit, though larger, as the US 1928 Fort Meade Experimental Mechanized Force, which also had a few British-type heavies and a handful of Renaults—all of World War I origin. But unlike the British, who were kept from creating the brigades found necessary because of lack of money (further British experiments in 1929, 1931-32, and 1934 had to be on a similar scale), the Red tankers had the backing and unlimited financial and industrial support of the Soviet Union—and of the iron hand of Joseph Stalin himself. Unlike the US Army, whose 1930 Fort Eustis test of 30 tanks and 10 armored cars came to nothing because only \$284,999 was available in 1931 for the mechanization of all arms, the Reds weren't troubled by the Great Depression which began in 1929. It gave them a fine chance to get a long lead on the French, British, and Americans. It gave them a chance to buy the best US and British engineering talent to aid their First Five-Year Plan, for the big firms were then not averse to taking Moscow gold in return for helping what the Reds proclaimed to be the build-up of their war potential.

The Reds thoroughly studied foreign mechanized trials. Right up to the German attack in 1941 they avidly followed foreign discussions of armor, reading carefully the published works of Britain's General Fuller, Germany's Guderian, and Austria's Eimansberger. They devoured foreign service journals; their own became important forums for discussion and dissemination of tactical, technical, and training material. The Reds do not mention General de Gaulle's

Armée Choc as having been as inspirational to them as it was to Guderian; but by the middle 1930s General Martel—father of Britain's Armored Corps—found his book *In The Wake Of The Tank* translated and widely circulated by the Red Army. (Russian use of the word "mechanized" to denote combined arms based on armor follows British practice; "motorized" is used for truck-borne outfits, while in this era "tank" is used to designate units consisting almost entirely of tanks.)

On the basis of their study and of their own work the Reds got out in 1931 their first combat regulations for armor. Unlike the French, British, and Americans they at once recognized that independent armored units comprising all arms could amount to more than a modern counterpart of light cavalry; it was seen that such units could have decisive effect if used in proper combination with other arms.

In 1932, two years before Germany formed her first armored divisions, the Soviets assert that they formed their first "moto-mechanized corps." This "corps" was up to and throughout World War II the Soviet equivalent of an armored division. (Similarly, their "mechanized brigades" have been of regimental size.) In 1932 the Russians also formed a senior school for armor—the Stalin Military Academy of Motorization and Mechanization, Stalin himself signalizing the opening with a statement emphasizing the importance of the school and arm.

While the Reds deserve credit for being the first military force officially to hail the wisdom of the armor prophets who were without honor in their own countries, and to recognize armor, air, and motorization as essential in modern armies (other forces didn't even voice such aims as pious hopes till well after 1927), it would seem that their potential advantage was somewhat compromised by unnecessarily hasty action.

There was no pressing need in 1927-32 to jam new tanks into production. So far as strategy is concerned, at this time Hitler was not yet in power; the Red Army and the Reichswehr were still working warily together at their joint Kazan tank school. Voroshilov has confessed that up to 1927 nobody in Russia had thought of preparing the Soviet Union for a war of "actual significance." In 1927, the best threat the Reds could frighten themselves with was the "menacing attitude" of utterly defenseless Britain.

The sudden about-face from the happy-go-lucky Frunze days—the almost frantic creation of immense armored and air forces, was clearly more a spectacular political gesture than a well-considered military move. But like many Red politically inspired actions before and since, it had its sound military aspect, too; in view of Russia's industrial backwardness, it was a sin not to have lit a fire under industry before 1928.

Believing that the British and Americans had had

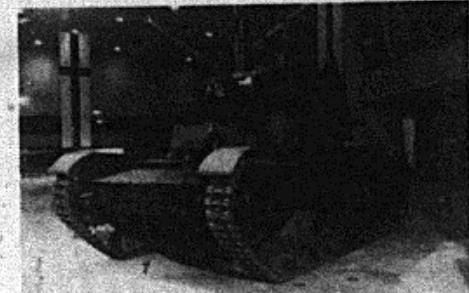
more automotive experience than the French and Germans—and that Vickers had shown itself foremost in tank work, the Russians went to England for designs that would work. From America they obtained ideas and tools for modern mass production plants. In this 1931-39 period of reliance on foreign tank know-how, the Soviets built 32 tank models, of which the 10 put into production were all based on foreign designs.

The Russians themselves had not been neglecting the development of home-grown designs. Prior to the decision to turn to more soundly engineered foreign chassis, in 1929-31 the Russian engineers had driven themselves almost mad by experimenting with no less than 8 tank models. In their efforts to replace the Russki Reno of 1920, the 6-ton T-18 (MS-1) of 1927, and the 20.3-ton T-24 (only made in very small numbers), they worked on the tankettes T-17 (1929) and T-23 (1930); the light tanks T-19 and T-20 (1929); and the mediums Direnko (1930) and Grotte (1931).

Active as they had been, the Soviet engineers just didn't have the industrial and automotive know-how to design satisfactory chassis and engines, and particularly transmissions and engines. They had a terrible time with teething troubles, or "childhood diseases" as Russian engineers put it. An additional handicap was the fact that before 1930 there was no native Russian tank armament industry; guns were imported or "trophies," 37-mm French Hotchkiss cannon and 8-mm Hotchkiss machine guns being favored.

It might be maintained that Soviet authorities were not a little impatient with their engineers, and that foreign engineers also had trouble perfecting tanks. Certainly the US Army had no little difficulty with their 1918-19 American-built Renaults right up to the time they went out of service. When Mr. John Carden submitted his tankette in 1927, General Martel at once noted that though Carden was obviously a genius and an engineer of considerable experience, his prototype had many mechanical defects. Not until a year later did Carden—later knighted—bring out his very satisfactory Mark VI version to replace his bug-infested Mark IV. But Martel also noticed that the tankette Morris Motors (Britain's native-grown equivalent of Ford) submitted in 1927 in short order proved to be a reliable vehicle. The fact is that the general performance of these Soviet home-grown tanks, as well as their teething troubles, made timely perfection seemingly hopeless.

Re-evaluation of the Soviet figure of ten tanks produced in 1931-39 reduces it to six. The BT series was based on the same tank; the T-38 was an improvement on the T-37. All basic models were undertaken in the first two years—the T-27 tankette, the T-26 and BT-2 light tanks in 1931, the T-37 amphibian in 1932, and the T-28 medium and T-35 heavy in 1933.

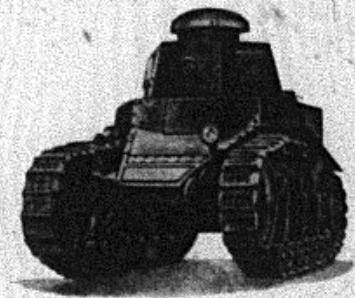


T-26

Carl Mydane—Life

(comparable to the T-26), with the Pz.Kw. III and IV mediums coming into production in 1937. The Germans acknowledged the utility of a heavy breakthrough tank and made experimental models, but not until 1941 did they feel ready to undertake a production project. Their whole Army armament production program of the 1930s was far more modest than the Reds', interest being focused on training.

It was to Martel (who in 1925 helped pioneer the idea of the British tankette) and Carden—through the Vickers firm—that the Russians turned for their first new production design of the 1931-39 period. This vehicle was actually a corruption of the original Martel idea of small, cheap little tanks, hosts of which were to be built to overwhelm antitank defenses while directly supporting assaulting infantry. The British Army turned the idea into a machine gun carrier. In the 3-ton Russian edition—the T-27—the Reds were able to fit a tank machine gun which more closely



T-27

fulfilled Martel's concept of a light dismountable gun than did the heavy British watercooled Vickers-Maxim. The tank adaptation of Degtyarev's 1927 "DP" infantry cal. .30 light machine gun can quickly be fitted with a bipod and front sight; it is equipped with a telescoping skeleton stock and 60-round drum. (When a Soviet tanker is overheard saying that he has the DTs, he is merely referring to these guns—"D" for V.A. Degtyarev, "T" for tank. The DT derives from the DP via the very similar—now abandoned—DA aircraft machine gun.)

The specimen tankettes the Reds acquired in 1929 were actually Vickers Carden-Lloyd Mark VI's, as such they enjoyed the engineering experience of two talented men, Carden and Lloyd, as well as of Vickers production experience, and its automotive knowledge stemming from its famous Armstrong-Siddeley auto and aircraft engines. The Russian versions were 9½ feet long, and had but .24-.35 in. armor; they could make 28 m.p.h.

The Russians had no reason to be ashamed of their adoption of the Carden-Lloyd design. Vickers also sold a license to build these tankettes to Italy's famous Fiat auto plant, from which came the many little M1933 Italian two-man tankettes used right up through 1942. It was this type of tankette which was roughed up by Russian T-26 light tanks during the Fiats' notorious demonstration of their (and the Fascist Militia's) military qualities at the Battle of Guadalajara north of Madrid, in 1937. Another famous European automotive firm—France's Renault—also bought rights to the Carden-Lloyd tankette; from it Renault developed the 1934 AMR light tank of the French mechanized cavalry, and the little "chenillette" unarmored prime mover in wide use in 1940. Poland made these tankettes on license, and from it the Japanese developed their Type 32 (1932), Type 34, and Type 37 two-man tanks which they used against China and in World War II. The British ended up with the famous open-topped Bren Gun Carrier of the late unpleasantness.

In accepting the tankette the Reds were not being slavish imitators. As so frequently happens in original thought and research, conditions cause the same idea to crop up in more than one place at the same time. So it was that the Russians, quite unknown to General Martel, had been fond of the idea of the one-man tank for some time before 1920. Besides Mr. P.'s little amphibious bug in 1915, in 1918-19 there had been a project by an engineer named Maximov for a one-man, one machine gun tankette of 7 tons, armored with .35-in. plates, and making 7½ m.p.h. with a 40 h.p. Fiat motor made by the Moscow AMO plant. The reason for adopting the Carden-Lloyd was industrial; it wasn't evidence of lack of originality of military thought.

The T-27s very quickly passed out of the Soviet

armor picture. Unlike the Germans, who at this time pinned their faith on masses of 6-ton light tanks armed with rifle-caliber machine guns (these Pz.Kw. I's were still the most numerous tank type in the 1939 and 1940 Polish and French blitzes), the Reds by 1934 were building their main strength on the 10-ton T-26 and the 13.4-ton BT-5 light tanks, both of which by then were being armed with a 45-mm long gun and a coaxial rifle-caliber DT. The common British Carden-Lloyd Mark VI light tank was of weight comparable to the German Pz.Kw. I, as was the little French AMR. The Reds didn't exactly throw the T-27s away; some use was still being made of them during the siege of Leningrad in 1941-42.

The most important aspect of this T-27 tankette was that with it the Soviets accepted a principle voiced by General Martel around 1925. Martel's idea was that such tanks should have components which were in common commercial use. Since the now Molotov Plant at Gorki was to build Model A Fords, Model A engines and other Ford A components, they were incorporated in the Soviet tankette. Because in 1931 the GAZ factory wasn't ready to build the parts, they had at first to be supplied from abroad, from Cologne Ford in Germany.

When the T-27 passed out of the armor picture, the tank which succeeded it in utilization of the automotive industry base was the 3.86-ton amphibian (*platnichchii*) tank T-37. This little two-man vehicle derived from the 1931 Vickers Carden-Lloyd amphibian, in which European armies were generally disinterested. Lightly armored to facilitate flotation, it had but .35-in. armor on the front, with about .16-in. elsewhere. A two-blade propeller gave it a water speed of 2½ m.p.h.; its land speed was 22.3 m.p.h. Its introduction does not appear to have started a jurisdictional dispute with the Red Navy concerning possible Army invasion of its realm.

This amphibian was widely used in reconnaissance units of infantry, cavalry, and mechanized outfits up through the Finnish War of 1939-40. Till then it might also be mixed in with the T-26 light tank in accompanying tank battalions assigned to infantry divisions, there being 16 T-37s to 22 T-26s in a typical battalion. (The US assigned a company of light tanks to its infantry division T/Os during this period.) The main mission of the amphibians was combat reconnaissance; recon in fluid situations was the job of armored cars.

The T-38 of 1935 was a slab-sided improvement designed so as to be easier to turn out. It had a high speed (28 m.p.h.) despite less weight and the same armor thickness. The turret with single DT was moved from the left side to the right—an action perhaps symbolic of the growing conservatism of Red Army men.

On the T-37 and -38 the Reds used a scissors suspension simpler than the Vickers edition the British

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Army found so attractive. The Soviets tell us utilization of the automotive industry as a light tank base continued up to and during World War II, with Gorki keeping its place as the center.

The main infantry-accompanying light tank right up through the first summer of 1941 was the T-26. This *legkii tank* was also used to equip mechanized brigades and moto-mechanized corps, although the BT series would appear more suited to the role. Industrially, the T-26 lay between the more military BTs and the commercialized amphibians and tankettes. It relied on the tractor industry in theory, although until the mid-1930s this industry was still largely occupied with wheeled rather than tracked tractors. It was a heavier version of the Vickers 6-ton (US 6.7 tons).

The original T-26 prototypes bought from Vickers (and as at first made in Russia), had two turrets side by side. (This arrangement was favored by the US Infantry light tanks of the latter 1930s.) Following the idea carried out in the first Soviet tank, some tanks had turrets each with a DT, others had a short 37-mm Hotchkiss gun in their right hand turret. A few had but one turret, armed either with a long 20-mm machine gun or a flame thrower and a DT—a type used in Finland. With the advent in 1932 of the Russian 45-mm gun, these early T-26s were succeeded by swarms of the single-turreted type which fought in Spain, the Far East, Finland, in the occupation of Poland, and against Germany. In the latter part of the 1930s, Russia sent some T-26s to Turkey as protection against the Germans; in 1938 others were sent to back Chiang Kai-shek in his fight against the Japs.

The Russian 3-man T-26s with 45-mm gun ran to thin .59-in. plates all over. With a 1937 weight of about 10½ tons and a speed of 18½ m.p.h. with four-cylinder gasoline engine, the T-26 compared unfavorably to the contemporaneous US 1935 9.7-ton M1 Cavalry "Combat Car." Its armor wasn't as thick; it was slower, and far less maneuverable and reliable. Its tracks couldn't compare with the US rubber blocks.

The BT series was based on two samples and plans of the Christie tank which the Reds secured from the US in 1931. The two samples were built after Christie had completed an order of 8 for the US Army.

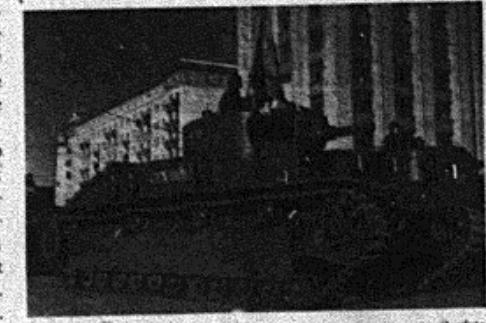
The BT series (*Bistrokhodnii Tank*—fast tank) was intended for use more or less as the US and British employed mechanized cavalry. Its high speed was useful in enveloping operations. It was a proper armored force tank, with the same armament as the T-26 but thicker (.87-in.) frontal armor. The Russians thought the BT could also be used in assault with infantry. When so acting, it was supposed originally to penetrate rapidly to the core of hostile defenses, attacking artillery and headquarters areas.

The series started off with the BT-2 in 1931. A fairly rare type identified by a turret front which

sloped like the forehead of a Neanderthal man, it mounted the Russian 37-mm M1930 tank version of the Red antitank gun of the same size—the same gun as the German Army's Rheinmetall 3.7 cm Pak. The tank version of the Army's beefed-up 45-mm M1932 edition of the Rheinmetall was followed by a proper M1934 45-mm tank gun, widely used by the many BT-5 tanks which made their spectacularly fast runs for the Red newsreels, and across Red Square during May Day and October Revolution parades. Following the appearance of the BT-5s in 1934, in 1937 there came into service the BT-7 with sloping sided turret. The BT-8, with Diesel V-12 engine and a 76-mm gun, appeared briefly and in small numbers in 1938-39. It was soon radically metamorphosed into the famous, successful, and still current T-34 medium.

The BTs saw service in Spain, at Khalkin-Gol, in the occupation of Poland, and against Finland. When the Germans invaded Russia in 1941, BTs and T-26s comprised about 75% of Red Army tank strength.

The Reds considered that the BTs had exceptional speed, and were good in cross-country going. Red characteristics gave the BTs a top speed with tracks of 33½ m.p.h., and (with tracks removed) a road speed of 46½ m.p.h. on its big hard-rubber tired bogies. The Reds seem never to have bothered with the track removal process, said to take 30 minutes. Americans who



T-28

Soviet

drove BT-5 tanks in Spain complained that the tracks had a tendency to remove themselves, especially if turns were at all abrupt and not handled smoothly. Wheel instead of lever steering was used. With a crew of three, the BTs varied from a low weight of 11½ tons to a final weight of 15 tons for the BT-7.

US development of the Christie halted before the Reds got going. The US Infantry wanted a light tank, and their idea of the upper limit of light weight was short of the Red. Ordnance believed that the Christie had many mechanical flaws; it wanted to perfect light tanks with our now famous volute spring suspension. The British were captivated by the Christies, and in the latter 1930s began work on their "cruiser" tank



Sovfoto

Left—BT-5, Right—BT-7.

series which armed their converted cavalry. In many respects the early cruisers were comparable to the BT's, although far more de luxe four-man tanks. However, only a handful were available in the early years of the war.

In 1933 the Reds produced the medium (*srednii*) tank T-28. With a short central turret with 76-mm gun flanked in front by two small machine-gun turrets, it was conceded by the Reds to have been inspired by the similarly laid-out experimental Vickers 16-tonner (18 US tons). The 30.8-ton T-28 had an armored, suspension and was fast for its time—24.8 m.p.h. It was employed in tank brigades to be assigned to assaulting infantry. The Reds also intended it to give fire support from covered positions as ersatz for artillery; or else it could act ahead of infantry in breaking into enemy positions to destroy artillery. (In the 1930s the Reds generally considered suppression of antitank fire the mission of artillery.)

A few T-28s served in Spain, where they attracted some favorable notice. Foreign observers of that conflict were most impressed with the 45-mm guns of the T-26s. Five years after it was produced its weight and firepower contrasted sharply with the 1938 US 18-ton Infantry medium, armed with a 37-mm gun.

In the big T-28 with its six-man crew and short 76-mm gun, the Reds displayed an appreciation of firepower and large-sized tanks, hinted at in their early adoption of the 45-mm gun and the BTs—which were more like mediums than lights in those days. When starting their 1931-39 tank series, the Reds had figured out that the French tanks built and under discussion were well-gunned and had respectable armor. (In the latter part of the 1930s, the French mediums ran from 22½ to 35 tons, with a 47-mm Hotchkiss plus—in the case of the Char B, which looked like a US 1941 M3 Medium—a 75 in the front of the hull; their armor protection far outclassed the Germans' and Reds', the Char B running to 2.76-in. on front and sides. The British tanks the Reds thought speedy, but thinly armored and poorly gunned. The

American tanks they classed with the British; the Reds thought US armament even weaker than the British.

The Reds' notion of how to resolve the balance of speed, guns, and armor in their new tanks was typically Soviet Russian. The order was to be tops in all three essentials. The Red political factions behind the Five-Year Plans were used to ordering the impossible and getting it—or a reasonable facsimile. But the order proved easier to give than to execute. Not till later in the Soviet era could such a directive be fulfilled.

Present protestations of early Red desire for equal emphasis on speed, guns, and armor may well be hindsight. The evidence is plain that what interested them most was speed, then guns—as represented by bigger and higher-velocity cannon. Armor came out third even on the heavy T-35 breakthrough tank; this 49-ton monster had armor no thicker than the 14.3-ton French D-1 accompanying tank of the early 1930s.

Up to 1938 most Soviet tanks had armor not more than .8 in. thick. The T-26s and BTs were theoretically only a little better off for protection than the smaller, lighter British Carden-Lloyd Mark VI light tanks still used when Wavell defeated Graziani in Egypt in 1941. The tin-plate amphibian tanks were worse off than the British Bren Gun Carriers. The rated armor thickness of the T-26s was exactly that of the German Pz.Kw. IIs before they were strengthened.

The Soviet authorities make it clear that the Red Army didn't become conscious of lack of armor protection until the Finnish War of 1939-40. The Spanish Civil War, which proved to many that light tanks had too light armor to face antitank, and caused the loyalists to thicken the armor on the T-26s they built, seems to have been regarded by the Reds as inconclusive. Tanks were not available for use in the necessary mass, nor were troops trained in the proper employment of armor. (The chief effect of the Spanish proving ground on Red arms seems to have been the revelation of the need for semi-automatic breechblocks on the 45-mm tank and antitank guns, to speed up their rate of fire.) The fact that the Japanese were

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not a first-rate tank or antitank army seems to have been overlooked in assessment of the 1938-39 Asiatic brushes.

According to the Russians, it was the power of the field artillery in the Mannerheim Line which caused them to sit up and take notice of armor. It was the Finns' 37-mm Bofors that convinced the Reds that their light tanks couldn't stand up to standard antitank.

The Reds say that the changes in armor protection brought about by the Finnish War were "abrupt and drastic." Mr. Stalin himself was aroused. As a result the repeated request for a miracle of design—a combination of the best in speed and guns and armor—was fulfilled, and quick—to produce a third series of Soviet tanks.

Impressed with the effect of the T-28's 76-mm armament on Mannerheim Line fortifications of all types, the Reds added armor to its front and sides to make it more suitable for attack on fortified positions. Front and turret armor was increased to over 2 inches, sides to almost two inches, thereby increasing the weight to 34 tons. Its armor had already been improved in production versions from .8 in. to 1.2 in. in front and .8 on sides—in an arrangement similar to the original German production Pz.Kw. IVs.

The real protective quality of Red armor plate during the 1930s was not to be gauged by figures of thickness. While the rolled plate was generally of far more uniform thickness than later cast armor, actual measurement was somewhat inconclusive, since variations were permitted above (but not below) the specified thickness. More serious evidence of industrial unpreparedness for an extensive armor program was the fact that up through 1936 at least Russian armor was "soft." Robert Gladnick, a Bronx boy who drove BT-5s in Spain, has made the remarkable statement that at the Battle of Teruel in 1937 he found Soviet "soft" armor more advantageous than that shielding the little Krupp Pz.Kw. I tanks of the Condor Legion's Panzergruppe Dohne. He said antitank projectiles would pass right through a BT and out the other side, leaving clean, small holes. There was no interior flaking to wound the crew, nor was the plate shattered so as to leave areas vulnerable to small-arms fire—objections which were voiced about Krupp armor. Hence, if an antitank projectile hit no vital human or mechanical part in its passage through the BT or T-26, the tank got along just fine.

Mr. Gladnick's statement about armor quality is confirmed by other observers; what makes it most significant is that he had picked up the idea from a Russian instructor, and was in 1938 using it as a serious argument in favor of Russian armor as opposed to German.

Of course, the Red Army appears to have dumped on the Spanish Loyalist government some of the worst of the matériel it received in the early days of frantic

rearmament under the First Five-Year Plan. Nevertheless, the inferiority of the armor and other weapons the Red Army foisted off on its Spanish colleagues is evidence of the effect on military potentials of hasty industrial effort with emphasis on quantity rather than quality. There might have been some excuse for Soviet industry's failing to make the grade on new-type weapons like tanks; the Spaniards thought there was no justification for the bad steel and poor workmanship on so-called "star gauge" M1891/30 Mosin rifles made in 1936 by the ancient Tula Armory.

Later, during the Finnish War, late model T-26s and BTs revealed that they had brittle plates which shattered and flaked like the Krupp tanks in Spain. By then the Soviets had shifted from riveted to welded armor. Beginning in 1937 the 45-mm gun turrets with their vertical sides were replaced on new tanks by a similar turret with sloping, rounded sides, and a more conical appearance.

Speed was the preoccupation of Russian armored theorists in the 1930s. They started out with what they thought were fast tanks and kept trying to increase their speed. The Reds also strove to improve tank handling and maneuverability. Efforts were made to increase the operating radius of armored force tanks to 124 miles, so as to permit long-range operations in mobile warfare. (Exterior fuel tanks were not then fitted.) By 1936, the Reds were convinced that satisfactory range could not be obtained without installation of Diesels.

The drive for speed was fulfilled largely through improvement of engines. In this era the aircraft industry continued the work on tank development begun with the T-24's 250 h.p. motor. Its contribution was the powerful M-17 V-12 liquid-cooled motor which soon succeeded the US World War I-type aircraft Liberty as used by Christie. [The "M" designation refers to "Motor" plus serial. A. A. Mikulin, the aircraft engine designer who had worked with Captain Lebedenko in 1915 to produce the latter's strange, Martian-like 44-ton "tank," is not identified as having been associated with this power plant.]

The idea of using an aircraft engine to get a powerful tank motor is an obvious one often occurring to tank designers. But with the 500 h.p. M-17 and the BT tank, the Red Army set the pace for a high horse-power-weight ratio. The BT's 500 h.p. contrasted with the German wartime 26-ton Pz.Kw. IV's 295 h.p. The M-17-powered T-28 also outclassed the German IV's in power-weight ratio, despite the fact that the Germans started years later. (In Lebedenko's tank, Mikulin used two 250-h.p. aircraft engines, one on each wheel, to obtain a total of 500 h.p.)

When they took the engine bone in their teeth at an early date, the Reds made sure not to start with an old engine. Lacking automotive experience, they still had to borrow. Relations with Germany being good, the Reds were able to acquire the license to build the

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Munich Bayerischen Motorenwerk's BMW 6-plane engine. This fine 600-h.p. motor was a well-developed power plant used in many of the military planes which the German Reichswehr had built in secret violation of the Versailles Treaty during 1928-35. No German castoff, it powered the German Heinkel He 51 and Arado Ar 68 first-line fighters when the Luftwaffe was unveiled in 1935.

In adapting the M-17 aircraft engine to tank use the Reds encountered some difficulty (it required tremendous radiators), but with it they achieved a remarkable degree of air-armor standardization. Besides being fitted to the BT, T-28 and T-35 tanks, the M-17 powered such 1932 planes as Toupolev's TB-3 twin engine bomber, the Red Navy's MR-5 flying boats, and the Army R-5 and -6 biplane light bombers. In 1934 it was installed in Toupolev's four engined giant TB-3 heavy bombers—the ones foreigners supposed had the mission of roaring from Vladivostok to Tokyo.

Luckily for Red tankers, in the topsy-turvy land that is Soviet Russia the aviation industry had gotten a good head start on the automotive industry. It did not, like the latter, have to start practically from scratch with the First Five-Year Plan. But neither did the Russians have an easy time with aircraft engines; as late as 1944 Soviet official publications were won shipping mass production of aircraft engines as the ultimate in industrial achievement; they admittedly stood in awe of Curtiss-Wright and Pratt & Whitney.

On the whole, the Red tankers' drive for speed accomplished little. The BT with its top of 34 m.p.h. was actually less of a "fast" tank than the better-armored, faster, more maneuverable US lights of 1935 and after. And the US lights had half the power. The heavier German Pz.Kw. III of 1937 could do as well. The IIs of 1933 were at first faster than the T-26s, and the Is had an edge on the contemporaneous T-37s.

There is little doubt that in this 1931-39 series of tanks, the Red Army was getting low military efficiency per ton and per horsepower. Guns, not design, speed, or armor, distinguished the Soviet tanks. Indeed, it would appear that widespread use of the 45-mm long gun in light tanks was the only outstanding Soviet contribution. The waste of space and size and power was worst in the T-28, which for an extra 8 tons and vast bulk got only 2 or 3 m.p.h. over the German IVs—gun and armor being roughly similar.

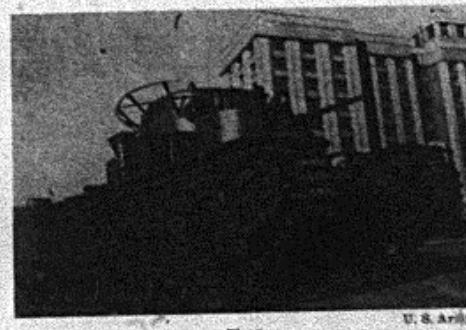
No wonder Soviet designers had thought they could do better. In borrowing foreign designs in 1930-32, after the Western powers had sunk to the bottom of a 12-year disarmament slump aggravated by the depression, the higher Red authorities couldn't well have made a worse mistake. They may have got chassis and engines that would function, but at a cost in over-all military design. When rearmament ended and French, British—and even stony-broke American-tankers got cracking beginning around 1934-35, they rapidly put into deep shade the basic British-American

developments the Reds had put into intensive production. The Russians certainly improved on the military characteristics of British-American tanks of the 1920s, but initiation of manufacture of such vehicles in the early 1930s was no way to prepare for a war late in the 1930s. With a nation as industrially backward as the Soviet Union then was, production change-overs to new models were far greater undertakings than in the West. Of necessity the Reds were stuck for some time with whatever models they earmarked for mass manufacture.

The only consolation for the Reds was that the Germans had made a worse borer in originally counting on the 6-ton I's, at first backed only by the too lightly armed (20-mm gun) and armored II-ton II's.

It is more than possible that the degree of standardization achieved by the Reds in the 1931-39 period was far from desirable militarily; such ruthless standardization seems to have been made necessary by special Soviet circumstances and especially by the ever-rising production quotas, not only at the outset of the decade, but as the Hitlerian threat developed toward the end of the period.

Certainly there was a remarkable degree of standardization and interchangeability of components. The 45-mm gun turret was used on the T-26 and BT light tanks, on the BA-10 armored car, and on the T-35 heavy tank. The 45-mm tank guns were very close approximations of the Army antitank pieces and of the Navy dual-purpose 45/46. (Peculiarly, it was noted



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Reno and T-18 of the 1920s. Then the Russians favored Renault practice of a ballistically desirable arrangement of plates that made turrets and hulls practically impossible to mass produce.

In the new era simplicity and ruggedness became the order of the day. The prototype of the T-26 may have been a cheap tank which Vickers had been able to sell during the depression to Siam, Poland, Finland, and other nations (it was used in the Chaco in South America); still the Russians felt compelled to simplify even further their 1934 version. This was done at the expense of ballistic efficiency of the armor, for of the two Red light tanks only the frontal hull armor of the BT was shaped to make the work of armor piercing projectiles at all difficult.

With the 1937 45-mm turrets there was a return to better ballistic design; similar slope-sided turrets appeared on the T-28 medium and T-35 heavy tanks. Minor turret improvements began to be made, adding to production complexities. Spring-loaded hatches for tank commanders, and specially sealed ones for gunners, made their appearance on the later T-26s and BT-7s. They replaced the clumsy rectangular sheets used on earlier models. At this time a rather complicated antiaircraft mount was installed on the turret roofs of the light, medium, and heavy tanks; it had fancy forward-area sights and more gadgets than the effectiveness of a caliber .30 flak could ever hope to justify. On it was supposed to be placed an extra DT machine gun, another antipersonnel mount for which was also fitted in the rear plate of BT and T-26 turrets.

As the 1930s progressed, there were more and more indications that Red Army tankers and designers of the tank engineering service were competent to turn out some very sound, powerful, and effective military vehicles—if they had not been haunted by ever-present politically created incubus of constant quantitative expansion; if they had not been foiled in translations of plans to metal by a constant leavening of skilled industrial staffs by new, undertrained technical rookies.

The return of sanity to the Red Army is suggested by its neglect of the heavy T-35 tank. This 49-ton giant was a bigger and better edition of the 1925-26 British "Independent" tanks—tanks designed to operate ahead of infantry in the assault of a fortified position. The British built two just to get the hang of the type as insurance against production in war; the Russians built a limited number.

While the British versions had a 3-pounder (47-mm) gun in a central turret with two machine gun turrets in front, and two in rear, the Russian edition of this rolling robber baron's castle had the T-28's 76 in the main turret; each pair of subsidiary turrets included one 45-mm gun turret and one DT machine gun turret, as used on the T-28. With a possible total of 8 DT machine guns, a .76, and two 45's, and a ten-

man crew, the T-35 was still not as big as the two monster 72- to 81½-ton French "C" tanks built too late for World War I—but it was big enough. Though the T-35 could make 18.6 m.p.h., its armor ran to no more than 1.18 in; at that it was better protected theoretically than the British Independents.

Armament was fitted in the rear in these Russian, British, and French tanks because they were intended to work right through enemy defenses, outrunning protection of other arms.

It is perhaps significant that the Russians are not on record as having used the monstrous T-35's against the Mannerheim Line. In that war they found that even the squat T-28 mediums were very vulnerable to close-in attack because of the dead space afforded by the high side of the hull; one Finn halted and finally captured intact a T-28 just by using a crowbar on one rear sprocket. When the Germans attacked, the T-35 in the battle zones generally came to a more ignominious end than the crowbarred T-28. When von Stulpnagel's army ran across some in Lwow in the very first days of the war, the Germans didn't have to take military action. Having run out of gas, the T-28s had been abandoned by their seemingly very wise crews. After their initial experience with armor in World War II, the Germans were rightly contemptuous of the T-35. They informed recruits who goggled at the big tank that the T-35 was a *Kinderschreck*—something with which to frighten children.

The T-35 was not so much of tactical as of general significance; it betrayed the nature of the mind behind Soviet military power of its day. At the time it was built Soviet Russian leaders were suffering from mental elephantiasis—the biggest cult mentioned above. They were building over-large steel mills like Magnitogorsk, and giant dams like the Dneprstroy. Military elephantiasis took the form of the T-35 tanks, the big TB-3 bombers (world's biggest in their day), and the idea of the "Flying GHQ." Because of the difficulty involved in central direction of simultaneous wars against Germany and Japan, the Maxim-Gorky—for some years the world's largest landplane—was built in 1934 to permit the Army high command to cover a two-front war.

Another aspect of the T-35's general significance is its demonstration of the degree of military achievement made possible by Soviet emphasis on war preparations. While Britain and France could afford no more than samples of such tanks, the Red Army was able to go ahead with a production order large enough to establish the actual tactical value of the concept in field exercises.

Peacetime field experience was clearly of great value to Red tankers. It is clear that with their masses of tanks available for maneuver, more than a few Red tankers hit on practical proof of the value of self-propelled artillery to their arm. This was no great discovery; others in America and England had divined

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as much from ivory tower ratiocination. It is therefore somewhat of a mystery why the Red Army didn't divert some of its industrial facilities to the intensive production of such weapons.

Around the middle of the 1931-39 period the Reds did mount on a 6-wheeled truck a 76-mm piece protected by a large armored shield. The piece itself was merely a short M1927 infantry cannon, for the Russians—like the US Mechanized Cavalry Brigade of the latter 1930s—used light howitzers in their mechanized outfits of brigade size. Prewar T/O's of the Red Army version of the armored division—the Moto-mechanized corps—varied, but some had a battalion of 12 of the self-propelled 76's included in each of its two mechanized brigades. The heaviest artillery of the "corps"—two batteries of 122-mm gun-howitzers and one of 76-mm guns (useful as heavy antitank)—were all truck-towed and organized within the motorized rifle brigade.

Reports in the latter part of the 1930s mention self-propelled artillery working with mechanized units; south of Moscow in 1941 a German motorized division reported engaging and destroying Red armor equipped with self-propelled artillery ranging as large as 150-mm howitzers. This report might have mistaken the 152-mm armed KV II heavy tank for a self-propelled piece. But whatever self-propelled specimens there were, were the exception, not the rule. It is admitted by the Red military that the Red Army, like the Germans, failed to appreciate the utility of such weapons. They were only awakened when lack of mobile artillery permitted von Kleist to escape destruction during his rout from Rostov in November, 1941. Before the war, the only standard weapons approaching the self-propelled class were quadruple cal. .30 heavy Maximons on trucks. These were intended for the protection of march column. (The US Army had tried out such light flak after World War I, and found that the type distinguished itself only by burning up ammunition.)

As might be expected from a nation the military of which has always thought highly of artillery, the Red Army always officially stressed the value of artillery in support of armor. In practice it did no better than the Germans, assigning no more than the light pieces mentioned above.

In contrast to this regard for artillery was a mid-1930s view that tanks—even lights—were a substitute for artillery in the support of infantry. The Red Army reckoned that a tank company of lights might be worth a light artillery battalion.

Around the end of the 1930s, the average Russian moto-mechanized corps and brigade was very weak in tanks—the element which the Germans found essential to the success of that type of unit. T/O strength appears to have been as much as 50% and more under that of German divisions used against the West in 1940—if the reconnaissance tin-plates are excluded,

which they should be. A typical Red Army "pocket armored division" of the time—a mechanized brigade complete with three tank battalions (each 53 tanks), artillery battalion, rifle and recon battalions—ran to 160 BT's, with 19 T-37s and 24 BA-20 armored cars for recon.

Standardization of unit armament for ease of field maintenance, and for more uniform tactical performances, kept the Red Army from mixing in with their light tanks a few artillery-armed tanks for fire support. The T-28s—which as a matter of fact were fairly fast and smooth-running in cross-country work—were generally reserved for use in "tank brigades." Actually of regimental strength, around 1936 these brigades ran to four battalions of 32 T-28s each. Such tank brigades were assigned along with the mechanized brigades to corps and armies, the medium battalions usually being parceled out for infantry support. A mechanized cavalry regiment (a fat battalion) was often included in cavalry divisions along with horse regiments; cavalry was often called on to act with mechanized brigades in enveloping operations and meeting engagements.

Compared to the German panzer and US paper mechanized division of the 1930s, the prewar Red Army mechanized brigades and corps were lacking in simplicity of organization. Various types of weapons and troops were not held under central control for assignment to combat groups according to given situations, but parceled out in advance so that Corps and army commanders might have independent outfits to combine as they saw fit, but lower units were often stuck with clumsy, intricate setups.

The Red Army was not unaware of organization defects. The now-famous tanker Marshal Pavel Rotmistrov as a colonel complained on June 1st, 1940 in RED STAR that it was unnecessary for infantry to have their own T/O tanks. He was strongly opposed to the natural tendency of commanders to employ tanks piecemeal or on secondary tasks. He showed that good Red tankers knew how armor should be used, and were well aware of the sins against armor to which higher commanders the world over proved to be prone.

Organization and suitable development of infantry and artillery armored units was undoubtedly affected by the industrial situation. In the 1936 fall maneuvers near Minsk, rifle infantry working with a Moto-Mechanized Brigade rode the tanks into action. (The Russians sometimes paralleled US mechanized cavalry practice, and used machine-gun battalions as the infantry components of their mechanized units, the rifle battalions being borrowed when needed.) This use of tank-borne infantry was not necessarily a harbinger of later German wartime practice and of the US tank-borne infantry school started on the Anzio beachhead; the Red Infantry rode the tanks because industry couldn't provide the necessary tracked person-

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nel carriers or trucks for their proper transportation.

The trouble was that there appeared to be a great difference between producing some ten or twenty thousand planes and tanks, and producing the hundreds of thousands of autos and trucks necessary not only for the military, but for economy required to back the military. Voroshilov was quite unable to realize his dream of an army on wheels; up to the war the Red Army remained primarily a foot and horse infantry force, with plenty of artillery and tanks and air cover.

The junior position of the Soviet automotive industry was one reason. In October of 1931, when the new tank program got going, the expanded ZIS plant was just resuming operations. In 1930, it and the Yaroslavl factory had used mostly foreign parts in their very limited output. The main new auto plant—the GAZ Russian Ford factory—was just begun in 1931; by 1937 it had built a little more than 180,000 Model A trucks and 42,000 cars.

While foreign observers considered Russian tanks fairly reliable by 1937, the same could not be said for trucks. The inexperienced engineers and labor staffs had bitten off far more than they could chew. They consistently failed to meet what were very apparently hopelessly optimistic goals. On the 1st of January 1933, the Red Planners had expected all Soviet automotive vehicles to have risen to 125,000 total from the 1928 depressingly low level of 18,000. Even this goal—picayune by US standards—they had to reduce to 75,000. During the second Five-Year Plan, intentions to build new factories had to be given up; again goals were not made. The Army and industry screamed like wounded eagles because of the quality of the trucks delivered; the auto industry whined that the parts their subcontractors supplied were of very poor quality.

These troubles were encountered despite rigorous standardization. The Ford GAZ-AA 4-cylinder Model A truck of 1931 was the main Soviet production truck right up through the war. Though they had a Soviet ton-and-a-half load rating and were produced in some six-wheel versions, the GAZ-AAs could hardly be called ideal military vehicles. (They do have surprising ability to get through the Russian mud of spring and fall.) The 6-cylinder 3-ton ZIS-5 truck which began to come off Moscow production lines in 1933 was still in production in 1946. The only other truck was a heavy 5-ton Ya-5, which Yaroslavl began under the 1933-37 2d Five-Year Plan. GAZ did not begin production of its M-1 Ford 1934 V-8 passenger car until the spring of 1936. Before Russia got into the war, the best the auto industry could do for a counterpart to the US jeep was the GAZ-61—a high-sprung 1934 Ford phaeton to which engineer Y. A. Grachev added a front-wheel drive.

Under the circumstances, the 1937 claim to have come second only to the US in truck production was a deceptive use of statistics. It concealed the fact that,

with heavy production and small chance of obtaining high octane gas, fuel consumption and power problems were forcing the Soviets to the introduction of Diesel engines. Whether Diesels were more advantageous in every case was beside the point; they were going to prove a necessity.

It was from this industry that the Red Army drew its armored cars. While the British Army was obtaining armored cars from luxury-trade firms like Rolls-Royce, France from Panhard, and the US from La-Salle, the Red Army built its first 1930 series cars from the GAZ-A—the four-passenger, four-cylinder car. Ford vehicles were called "BA" plus a number—the BA standing for bronietomobil, or armored auto.

There appear to have been two main versions of light car. That on the Model A passenger chassis had one turret with DT machine gun, and was so small that the armor atop the turret and driver's seat was domed for the heads of the three-man crew. Some had no turret. Remarkable as it may seem, not all were fitted with radio.

When GAZ began to turn out the M-1 Ford in 1936, the 1934 V-8 chassis was used for a similar light BA-20—which was standard right up through the early war days. These tin plate 3-man cars were used to equip the recon elements of the moto-mechanized brigades and the mechanized cavalry regiments.

When Lord Beaverbrook went to Russia late in 1941, Stalin smilingly presented him with a set of photos proving that Russia had more armaments left than the West thought; one picture showed a great fleet of these armored sardine cans parading in Red Square. (The Germans thought so little of the BA-20s that they omitted them from their June 6, 1941 handbook on the vulnerable points of Soviet armor.)

The medium armored car was the BA-10, a 5.14-ton vehicle based on the GAZ-AAA Ford six-wheeled truck chassis. It was not a 6x6; production problems denied it a reverse—a strong contrast to the German 6- and 8-wheelers which had front and rear driving positions. Dual-wheeled, it had spare wheels centrally mounted so that they could turn and take a load should the car belly itself on a ridge. It mounted a modified 45-mm turret, and had two DTs.



BA-10

With armor .24 to .39 inches thick and a four-man crew, it made 33½ mph—the road speed of a BT on tracks. The BA-10s served in Spain, the Far East, and were presented to Turkey; they were standard throughout World War II. A fancy amphibious ancestor of 1930-31, with 37-mm gun and an extra rear machine-gun turret, never came into service. Borrowing a British idea, the BA-10 was supplied with tracks which could be fitted around the rear wheels.

The only field in which the Red Army seems not to have had trouble was the armored trains. This un-Western weapon persisted (the Japs had one or more backing their 15th Division at Lake Khasan, the Czechs, Chinese, and Poles had them too). Some were Navy-designed and manned, if used in support of coast defenses. They generally employed obsolete artillery and antiaircraft of their branch of defense service. Navy trains had guns as large as the Czarist 130-mm (130/55), with old pre-World War I 76/30's as heavy flak. Army trains used old 76-mm M1902 Putilov field guns and the Army M1914 version of the Navy 76-mm flak. Trains also had a host of single, double, and quadruple cal. .30 for protection against strafing.

More properly armored force troops were the motorcycle units, for like the Germans the Red Army used machine-gun bearing motorcycles with sidecars to support reconnaissance. These troops required their own industry; of five factories the most important were those at Moscow, Leningrad, and at Izhevsk in the Urals. Motorcyclists usually wore black padded cloth tank helmet, coveralls, and gauntlets. Sidecar troops were armed with infantry DP light machine guns they could fire (in theory) from sidecar mounts. Some solo cyclists had DT tank machine guns fixed on the handle bars, and provided with ground mount.

Like the auto industry, the tractor industry failed to make initial goals; it, too, encountered much greater difficulties than expected. Nevertheless, the big new plant at Stalingrad was in full production by the summer of 1933; the big Kharkov plant reached capacity in 1934. At first these plants produced wheeled agricultural tractors of no use whatever to the military. Opening in June, 1933, the heavy tractor plant at Chelyabinsk in the Urals had the task of initiating mass production of tracked tractors, though it, too, began on a wheeled International Harvester type. Chelyabinsk began "cat" production with a Stalineis 60 h.p. S-60, changing in 1937 to an S-65. A Chelyabinsk shift to Diesels begun in 1937 was completed in 1939. Its output was designed to be used as prime movers as well as for other civilian and military tasks. In 1938 it received a directive to turn out gas-generator (wood-burning) S-65s.

In May of 1936 Stalingrad changed over to cats, building the STZ-3—a light 52 h.p. type capable of towing light artillery. Kharkov converted to tracked tractors by 1940, building the same model at Stalin-

grad as the KhTZ-3. The tractor division of the old Putilov plant (renamed Kirov in 1934) at first maintained its wheeled tractor production, then added a line of small cats.

None of the STZ, KhTZ, ChTZ or Kirovets cats could be considered good prime movers for armored artillery. They could not keep pace with a fast column, for their speed was suited to the draft of World War I-type artillery lacking high speed artillery carriage axles. Their size and general characteristics made them unsuitable carriages for self-propelled artillery.

Towards the end of the 1930s special fast tracked prime movers began to appear. The first was the small armored Komsomolets prime mover. It seated two men in the armored box up forward, where a DT machine gun was mounted. Over the motor on the rear it could seat six back to back—quite in the open, except for a winter and bad weather tarpaulin. This tractor was often used as a prime mover for 45-mm antitank guns and 76-mm infantry howitzers of mechanized/motorized units. It made out very badly in the Finnish War, whereafter it was abandoned.

For medium artillery Chelyabinsk was producing a 6-ton fast prime mover, with metal cab and rear open-topped wooden box for the gun crew. For heavy artillery there was a similar 18-ton Voroshilovets, powered by a 500-HP tank Diesel. These sound cross-country vehicles didn't do Soviet armor much good since mechanized units didn't have medium and heavy artillery. They might have provided good self-propelled carriages but their potentialities in this direction went unexploited. They were not in the same class with the Samaris German Zugmaschine half-track line.

The work that the tractor and auto plants were doing for industry, agriculture, and other arms than armor posed serious mobilization problems. Since the people and the army had to eat and to be supplied with the materials to produce munitions, and since the artillery had to continue to move, of what good was the convertibility of elements of the automotive and tractor industry to tank production? The Red Army personnel of the thousands of machine tractors stations might be withdrawn from collective farms into the artillery and tank troops, but what then of food production?

The intensive tank production of the 1930s had been carried on in five factories, according to Soviet statements. The work was done in special plants at Moscow and Sverdlovsk, and in the tank part of the Kirov plant in Leningrad. Tank production was also done at the Stalingrad tractor factory (happily located just up the river from the Red Barricade gun factory and the Red October steel mill) and at Chelyabinsk. In the intensive military expansion of 1938-39-40-41, when the defense budget skyrocketed, planned conversions started and other plants were built or altered.

But in basing armor and other modern war material on a newly created and planned industrial system the

Soviet Union had placed itself in a strange position. The true nature of Red Military strength and its proper relationship to Western military practice could be revealed only by a major war. Some idea of the nature of the differences between the Soviet and the American position is best revealed by a listing of a few of the firms which during World War II helped the American Locomotive Company—lacking in previous tank-building experience—to produce the M7 105-mm self-propelled howitzer for the armored artillery. Among the myriad plants big and little participating in this armor venture were: The Estate Stove Co., The American Fork and Hoe Co., The Booth Felt Co., The Cortland Boot Jack Co., The Fort Plain Garage, The York Ice Machinery Corp., The Detroit Suspender and Belt Co., The Electric Sprayit Co.

In Russia, the order of industrial precedence favors first heavy industry, as the origin of all power, military and economic. Second comes the war industry. After that come industries necessary to the efficiency of the first two groups; this class includes industry which produces things like alarm clocks, to get the workers up on time. In reverse ratio to what has made the US and other Western powers industrially great, at the bottom of the Soviet industrial priority system are those catering to the civilian consumer. The Cortland Boot Jack Company would have had a terrible time justifying its existence in the latter 1930s in the planned socialist Soviet economy. In Russia, the industrial slack represented by such firms was almost nonexistent.

Purchase of the old Zeiss plant from the Germans (Zeiss used the money to re-tool with modern equipment) helped put the Red Army in a relatively good position as regards optical equipment. Whereas as late as 1940 US Armored Force M1 Combat Cars and M2 Series light tanks had only slits for vision, the Russian light, medium, and heavy tanks had turrets fitted with one or two rotatable periscopes atop the turret (usually the gunner had just his gun-laying telescope, the tank commander a periscope). Drivers had an episcope. True, such vision devices were not installed in the first tanks, but were supplied around the 1930's as related industry made them available. This optical equipment generally was of high grade.

With no great civilian electronics industry to back the military, it might be expected that radio was a headache to the armored force, both qualitatively and quantitatively. In general, only platoon, company, and higher commanders' vehicles had radio which appears to have been a transceiver. Platoon commanders (as did US company commanders in 1940) handled their tanks by flag signal. The Russian tank helmet was always designed for integral headphones, but no intercom equipment such as the German and British used, was fitted.

Command tanks throughout the 1930s were dangerously apparent because the armored antenna used were

thick rods fitted to the sides and rear of the main turret like handrails. The BT and T-26 series tanks had plenty of room for radio in the rear overhang of their turret; so did the mediums and heavies. Turret tops appear to have been fitted for buggy-whip receiving antenna, but not till just before the war did such aerials appear. Then they were apparently used to replace the conspicuous armored antenna. Radio remained a great and obvious deficiency. When the war began, the aim still was to have one radio to each three tanks.

Despite seeming topside disinterest in armored artillery and infantry, the Red Army tankers early tried out such wrinkles as the ST-26 bridge tank (a 1934 development which carried a girdle atop its chassis). At the same time they modified T-26s for flame throwers; in the assault on the Mannerheim Line versions of the improved flame throwers on T-26s had a range of only some 48 feet, air flasks and gallons of oil being carried in the roomy turret. They also furthered Czarist propeller-driven sledges; lightly armored ones mounted a DT, ran on skis, and were driven by the ubiquitous little M-11 radial aircraft engine.

By 1939 the Red Army had changed its mind about not using tanks in night combat. Many light and medium tanks were fitted with a pair of auto headlamps mounted just over their guns. After the Finnish war the idea of tanks illuminating their own targets seems rightly to have been abandoned.

Since the Italian and Germans had thought of flame-throwing tanks at about the same time, the Russian flame T-26s demonstrated no remarkable originality. However, in the taking over of Bessarabia from Rumania in 1940 the big TB-3 bombers landed T-33 amphibians they had carried secured under their bellies. Before that, Russian military glider designers, active since 1932, had come up with a tank-glider. A smaller T-26 with 45-mm gun comprised the fuselage; on its rear was secured two tail booms and a large set of one-bay biplane wings. Spoilers and flaps galore were fitted to make possible a slow landing speed. This glider, by O. Antonov, was called the AT-1.

A Russian improvisation tried out with success against the Mannerheim Line, involved the towing of tank-protecting supporting infantry in open-topped armored sledges. It worked because the Finns were weak in mortars. Of more lasting military value was the doctrine the Russians worked out for combat in the varied types of terrain peculiar to Russia. Their regulations had to deal with armored war on plains—the vast stretches of treeless open steppe; with combat in extensive forest and marsh; and of course with winter warfare. While many uninformed Westerners laughed at the Russian failure in Finland at the Kemi River and Souomisalmi, Colonel William Shippe (who had toured those parts of Finland as US military attaché) joined well-informed European military men in

expressing his amazement and concern that the Reds were able to operate any heavy equipment in those Arctic forests and wastes in December and January.

Despite their vast tank and plane programs, the Reds were nervous enough to sign a defensive pact with the Czechs and French as early as 1935—when the new Hitler war machine was hardly hatched. The armament program for the 3d Five-Year Plan announced the next year included a large-scale program of fortifications in the West (a considerable reversion from early ideas about mobile war), and more emphasis on creation of new ones beyond the Urals. Annual production of autos and trucks was to be upped to 400,000 a year by 1940. The planners intended that the third plan would stress actual armament work far more than the first two.

This emphasis on armaments, plus the progress already made with tanks, by 1938 brought to a close the "Middle Ages" of Soviet armor. It became possible to initiate a new era and a new wave of tanks. Soviet engineers, with names previously unknown, met in 1938 and 1939 to design a series of new tanks. The engineers of the Kharkov Diesel plant had acquired enough know-how to have perfected a good Diesel aviation type engine. Stalin, taking as close personal interest in armaments as has been Churchill's habit, is said to have used his dread direct influence to bring about a design miracle.

In 1940, two new tanks that were literally to revolutionize armor were actually in production. The medium and the heavy in speed, armor, and gunpower—and in many other less vital military characteristics—were far ahead of any tanks of the day. In many other less vital military characteristics, and in production aspects, they were also outstanding.

After almost a decade of brooding Soviet engineers and tankers were about to come into their own. As yet uninhibited in the development of military theory by established cliques, able to study and profit by foreign thought and progress without menace to the position and prestige of individuals, or to the industrial and the vested interests of engineering staffs, of bureaucrats, of arms, or branches of national defense, the officers of the Red armored force and the engineers of the tank engineering service were in a comparatively fortunate position compared to their opposite numbers in Western forces.

The question as to whether the Red politicians had been a help or a hindrance had yet to be answered. At any rate no one could deny they had mobilized the entire nation behind the army, and made the Soviet

peoples very tank-minded as well as air-conscious.

As regards personnel, Red forces had many trial runs. Experiences acquired as a result of the mobilization of the Leningrad Military District to beat the Finns had revealed that the junior officers were well below standard. Luckily, Hitler gave the Red Army high command a year and more for intensive pre-training. The previous occupation of Poland in 1939 had provided some interesting work by armored forces. Though beset by doubts; the Army enjoyed tightened discipline; its fighting spirit benefited from the fruits of a patriotism campaign begun as early as 1934. Buffer zones had been acquired to slow down any German panzer punch; vast fortifications had risen to protect those zones—far more than had existed in old pre-1939 Soviet Russia.

As for armor, the Reds knew that their accumulated tank strength made a piker out of Max Werner and his 1939 figure of 20,000 tanks; there were 21,000 Red tanks in June 1941. Included in this vast number were growing quantities of the hush-hush heavy and the new medium—tanks in comparison to which the contemporary German Pzkw III's and IV's were tincans armed with popguns; tanks which 88's would have to work hard to knock out, and which the standard German 37-mm antitank guns could bombard without results.

Over this mass of armor flew more planes than Goering liked to think of. When his technical chief, General Udet, visited the Kuibeshev aircraft engine combine in the spring of 1941 and was as impressed as the Russians hoped he would be (he held that this one complex exceeded in productive capacity all six major German engine plants), Goering told him not to mention the matter again, on pain of the concentration camp.

What happened when Hitler blindly threw some 4,000 tanks and a similar number of planes against this mass of armor and the vast tactical air divisions which could support it? The answer is already history—a history that has yet fully to be grasped.

In that answer is to be found a lesson undoubtedly most significant for the mass of materialistically minded Americans whose imagination, like that of the Reds of the 1930s, has been captured by statistics on the power and quantity of material. It is very apparently a lesson in the relative importance of the man and the machine—of the place of ideas, skill and fighting spirit in a war that many prophets had predicted would be entirely dominated by the tank, the plane and the motor.